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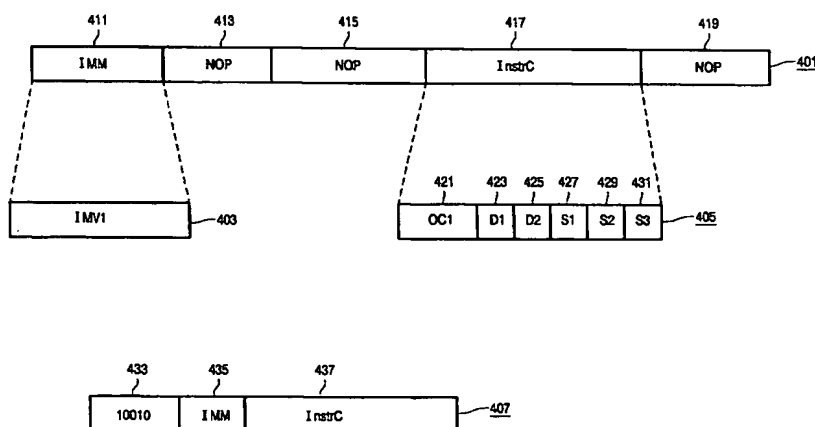
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[Continued on next page]

(54) Title: APPARATUS, METHOD, AND COMPILER ENABLING PROCESSING OF LOAD IMMEDIATE INSTRUCTIONS IN A VERY LONG INSTRUCTION WORD PROCESSOR



(57) Abstract: Differences in encoding efficiency of instructions may arise if certain operations require very large immediate values as operands, as opposed to others requiring no immediate values or small immediate values. The present invention describes a processing apparatus, a compiler as well as a method for processing data, allowing the use of instructions that require large immediate data, while simultaneously maintaining an efficient encoding and decoding of instructions. The processing apparatus comprises a plurality of issue slots (UC0, UC1, UC2, UC3), wherein each issue slot comprises a plurality of functional units (FU20, FU21, FU22). The processing apparatus is arranged for processing data, based on control signals generated from a set of instructions being executed in parallel. The processing apparatus further comprises a dedicated issue slot (UC4) arranged for loading an immediate value (IMV1) in dependence upon a dedicated instruction (IMM). The immediate value (IMV1) can be stored in a dedicated register file (RF2) and the issue slot requiring this value can retrieve it from the dedicated register file (RF2).



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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 886 210 A (MATSUSHITA ELECTRIC IND CO LTD) 23 December 1998 (1998-12-23)	1-4,6-12
Y	the whole document	5
X	EP 0 899 656 A (MATSUSHITA ELECTRIC IND CO LTD) 3 March 1999 (1999-03-03)	1-4,6-12
	the whole document	
Y	WO 98/27486 A (HEWLETT PACKARD CO) 25 June 1998 (1998-06-25)	5
	page 6, line 12 -page 8, line 21	



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Information on patent family members

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IB 03/03561

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0886210	A	23-12-1998	JP 11007387 A	12-01-1999
			CN 1208197 A	17-02-1999
			EP 0886210 A2	23-12-1998
			IL 124904 A	25-07-2002
			SG 91248 A1	17-09-2002
			TW 490636 B	11-06-2002
			US 6085306 A	04-07-2000
			US 2002129223 A1	12-09-2002
			US 2002144084 A1	03-10-2002
			US 6397319 B1	28-05-2002
EP 0899656	A	03-03-1999	JP 3327818 B2	24-09-2002
			JP 11073325 A	16-03-1999
			EP 0899656 A2	03-03-1999
			US 6367067 B1	02-04-2002
WO 9827486	A	25-06-1998	US 5870576 A	09-02-1999
			WO 9827486 A1	25-06-1998
			US 5930508 A	27-07-1999